NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CONNECTICUT / RHODE ISLAND

STREAMBANK AND SHORELINE PROTECTION

(Ft)

CODE 580

DEFINITION

Treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.

PURPOSE

- To prevent the loss of land or damage to land uses, or other facilities adjacent to the banks, including the protection of known historical, archeological, and traditional cultural properties.
- To maintain the flow or storage capacity of the water body or to reduce the offsite or downstream effects of sediment resulting from bank erosion.
- To control channel meander and shoreline recession that would adversely affect downstream and adjacent shoreline facilities while accommodating the natural fluvial processes within the stream segment and shoreline reach.
- To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, and recreation.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries where they are susceptible to erosion from the action of water, ice, or debris, livestock, pedestrians, or vehicular traffic. It does not apply to erosion problems on main oceanfronts and similar areas of complexity not normally within the scope of NRCS authority or expertise.

CRITERIA

General Criteria Applicable to All Purposes

Measures shall be installed according to a site-specific plan and in accordance with all applicable local, state, and federal laws and regulations.

Protective measures to be applied shall be compatible with improvements planned or being carried out by others.

Protective measures shall be compatible with the bank or shoreline materials, water chemistry, channel or lake hydraulics, and slope characteristics both above and below the water line.

End sections shall be adequately bonded to existing measures, terminate in stable areas, or be otherwise stabilized.

Protective measures shall be installed on stable slopes. Bank or shoreline materials and type of measure installed shall determine maximum slopes.

Designs will provide for protection from upslope runoff.

Internal drainage for bank seepage shall be provided when needed. Geotextiles or properly designed filter bedding shall be used on structural measures where there is the potential for migration of material from behind the measure.

Measures applied shall not adversely affect threatened and endangered species nor species of special concern as defined by the appropriate state and federal agencies.

Measures shall be designed for anticipated ice action and fluctuating water levels.

All disturbed areas around protective measures shall be protected from erosion. Disturbed areas that are not to be cultivated shall be protected as soon as practical after construction.

Vegetation shall be selected that is best suited for the soil/moisture regime.

Additional Criteria for Streambanks

Designs for streambanks shall be according to the following principles:

1. Streambank protection shall be started at a stabilized or controlled point and ended at a stabilized or controlled point.

2. Design discharge and/or hydrographs for capacity shall be determined by using appropriate analysis methods, such as NRCS Technical Releases No. 55, No. 20, or U.S. Army Corps of Engineers HEC-1, or HEC-HMS.

3. Stability design shall be determined using appropriate analysis methods, such as NRCS Technical Release No. 25 or by Tractive Stress Analysis such as those included in NRCS Northeast Technical Note 26.

4. Depending upon the complexity of the specific site, a water surface profile analysis (such as WSP2, HEC-2, and HEC-RAS) or other appropriate method shall be used to determine channel flow characteristics. When water surface elevations are a concern, the effects of protective measures shall not increase flow levels significantly above those that existed prior to installation.

5. Unless the protection can be safely constructed to a depth below the anticipated lowest depth of bottom scour, excessive bed degradation shall be controlled concurrent with the installation of streambank protection. Refer to NRCS Standard 584 Stream Channel Stabilization, for design and guidance.

6. Changes in channel alignment are not recommended unless the changes are based on a thorough evaluation of the proposed channel change together with an assessment of both upstream and downstream geomorphology. The current discharge – sediment regime shall be based on an assessment of the entire watershed above the proposed channel alignment.

7. Steep unstable slopes and deep undercuts in banks shall require grading to a stable slope or installation of structural measures such as cribwalls, rock riprap, gabions, rootwads, bulkheads, or other appropriate techniques. For planting purposes, the steepest acceptable slope is 2 horizontal to 1 vertical. Slope stability analysis and design shall be in accordance with acceptable engineering practice. Newly graded banks may require protection from overbank flow. Refer to the Standard for Diversions-362.

8. Structural measures shall be effective for the design flow and be able to withstand greater floods without damage. Slopes shall be stable immediately after construction for the 10-year storm or top of the lower bank whichever is lower.

9. Vegetative protection and incorporation shall be considered above the two-year storm water surface elevation.

10. Where deterioration of the streambank is caused or accelerated by vehicular, pedestrian, or livestock traffic, artificial obstructions for exclusion (such as fences) or designated travelways for access shall be provided.

11. Structural and soil bioengineering measures shall be utilized individually or in combination with other systems to provide an appropriate level of protection based on design flows and hazard classification of the area being protected. Refer to East Region Supplement No. 1 to Chapter 16,

EFH, for hazard classification system analysis. All measures shall be designed to avoid undesirable impacts upstream and downstream.

12. Where possible a 15-foot minimum buffer width from the top of the bank shall be established in grass and/or woody plants.

13. Potential soil bioengineering measures may be found in Part 650 EFH Chapter 16 and East Region Supplements.

14. Channel clearing to remove stumps, fallen trees, debris, and bars shall only be done when they are causing or could cause detrimental bank erosion or structural failure. Habitat forming elements that provide cover, food, and pools, and water turbulence shall be retained or replaced to the extent possible.

15. Measures planned shall not limit out of bank flood flow access to the floodplain.

16. Stream segments to be protected shall be classified according to a system deemed appropriate by the state. Segments that are incised or contain the 5-year return period (20 percent probability) or greater flows shall be evaluated for further degradation or aggradation.

Additional Criteria for Shorelines

Designs for shoreline protection shall be according to the following principles:

1. All revetments, bulkheads, or groins are to be no higher than 3 feet (1 meter) above mean high tide, or mean high water in non-tidal areas

2. Structural shoreline protective measures shall be keyed to a depth to prevent scour during low water.

3. The height of the protection shall be based on the design water surface plus the computed wave height and freeboard. The design water surface in tidal areas shall be mean high tide. Design of riprap for slope protection against wave action shall be in accordance with NRCS Technical Release 69.

4. When vegetation is selected as the protective treatment, a temporary breakwater shall be used during establishment when wave run up would damage the vegetation.

5. Recommended treatment shall be based on water salinity, and on soil type and slope characteristics both above and below the waterline. Slope characteristics below the waterline shall be representative of the slope for a minimum 50-foot distance from the shoreline measured at the design water surface.

6. End sections shall be adequately integrated with existing measures or terminate in stable areas.

7. Steep, unstable slopes and deep undercuts in banks shall be graded to a stable slope or structural measures such as cribwalls, rock riprap, gabions, or other appropriate techniques shall be installed. For planting purposes, the steepest acceptable slope is 2 horizontal to 1 vertical. Slope stability analysis and design shall be subject to acceptable engineering practice. Newly graded banks may require protection from overbank flow in accordance with the Standard for Diversions-362.

8. Where deterioration of the shoreline is caused or accelerated by vehicular, pedestrian, or livestock traffic, artificial obstructions for exclusion (such as fences) or designated travelways for access shall be provided.

9. Where possible a 15-foot minimum width buffer area from the top of bank shall be established in grass and/or woody plants.

10. Potential soil bioengineering measures may be found in Part 650 EFH Chapter 16 and East Regional Supplements.

Additional Criteria for Stream Corridor Improvement

Stream corridor vegetative components shall be established as necessary for ecosystem

functioning and stability. The appropriate composition of vegetative components is a key element in preventing excess long-term channel migration in re-established stream corridors.

Measures shall be designed to achieve any habitat and population objectives for fish and wildlife species or communities of concern as determined by a site-specific assessment or management plan. Objectives are based on the survival and reproductive needs of populations and communities, which include habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors and native plant communities. The type, amount, and distribution of vegetation shall be based on the requirements of the fish and wildlife species or communities of concern to the extent possible.

Measures shall be designed to meet any aesthetic objectives as determined by a site-specific assessment or management plan. Aesthetic objectives are based on human needs, including visual quality, noise control, and microclimate control. Construction materials, grading practices, and other site development elements shall be selected and designed to be compatible with adjacent land uses.

Measures shall be designed to achieve any recreation objectives as determined by a site-specific assessment or management plan. Recreation objectives are based on type of human use and safety requirements.

CONSIDERATIONS

An assessment of streambank or shoreline protection needs should be made in sufficient detail to identify the causes contributing to the instability (e.g. watershed alterations resulting in significant modifications of discharge or sediment production). Due to the complexity of such an assessment an interdisciplinary team should be utilized.

When designing protective measures, consider the changes that may occur in the watershed hydrology and sedimentation over the design life of the measure.

Consider utilizing debris removed from the channel or streambank into the treatment design.

Use construction materials, grading practices, vegetation, and other site development elements that minimize visual impacts and maintain or complement existing landscape uses such as pedestrian paths, climate controls, buffers, etc. Avoid excessive disturbance and compaction of the site during installation.

Utilize vegetative species that are native and/or compatible with local ecosystems. Avoid introduced or exotic species that could become nuisances or invasive. Consider species that have multiple values such as those suited for biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to locally used herbicides. Avoid species that may be alternate hosts to disease or undesirable pests. Species diversity should be considered to avoid loss of function due to species-specific pests. Species on noxious plant lists should not be used.

Livestock exclusion should be considered during establishment of vegetative measures and appropriate grazing practices applied after establishment to maintain plant community integrity. Wildlife may also need to be controlled during establishment of vegetative measures. Temporary and local population control methods should be used with caution and within state and local regulations.

Measures that promote beneficial sediment deposition and the filtering of sediment, sediment-attached, and dissolved substances should be considered.

Consider maintaining or improving the habitat value for fish and wildlife, including lowering or moderating water temperature, and improving water quality.

Consideration should be given to protecting side channel inlets and outlets from erosion.

Toe rock shall be large enough to provide a stable base and graded to provide aquatic habitat.

Consider maximizing adjacent wetland functions and values with the project design

and minimize adverse effects to existing wetland functions and values.

When appropriate, establish a buffer strip and/or diversion at the top of the bank or shoreline protection zone to help maintain and protect installed measures, improve their function, filter out sediments, nutrients, and pollutants from runoff, and provide additional wildlife habitat.

Consider conservation and stabilization of archeological, historic, structural and traditional cultural properties when applicable.

Measures shall be designed to minimize safety hazards to boaters, swimmers, or people using the shoreline or streambank.

PLANS AND SPECIFICATIONS

Plans and specifications for streambank and shoreline protection shall be prepared for specific field sites and based on this standard and shall describe the requirements for applying the practice to achieve its intended purpose. To the extent practical, specifications shall conform to NRCS National engineering Handbook (NEH) Parts 642 and 643 (formerly NEH Section 20).

AS BUILT DRAWINGS

As built drawings shall be prepared showing all elements as actually installed including elevations, thicknesses, gradations, plant materials, etc. A copy of the as built drawings shall be provided to the owner/operator, regulatory agencies, and participating organizations upon construction completion.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be prepared for use by the owner or others who are responsible for operating and maintaining the system. The streambank or shoreline protective measures were designed and installed to stabilize an eroding or otherwise unstable area. The estimated life span of the installed measure is a minimum of 10 years. Developing and carrying out a comprehensive operation and maintenance program can increase life expectancy. The O&M plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged or threatened components.